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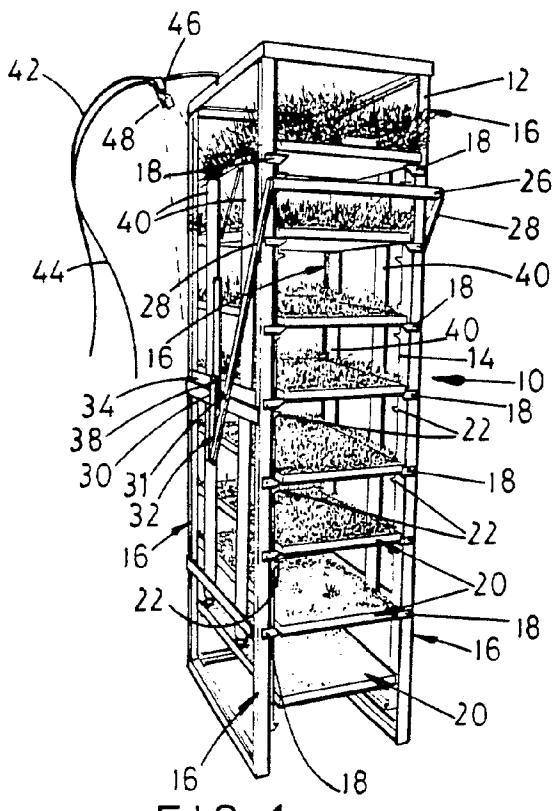
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## (54) Apparatus for and method of growing plants from seeds

(57) Apparatus for use in growing plants from seeds comprises a frame (12) supporting trays (20) raisable one step at a time. The trays are supported on pawls 18 on an outer framework 12, and are moved upwardly by means of handle 26 which when pulled downwardly moves an inner framework 14 upwardly to push the trays above the next-upwardly pawls 18. U.V. lamps 40 and water spray means 42-48 is provided. The tray may contain a plastics sheet covered with layers of peat or sand, seed soil and open-weave cloth on which seed mixed with peat/soil is spread. The cloth may be soaked in or coated with gel-type rooting medium.



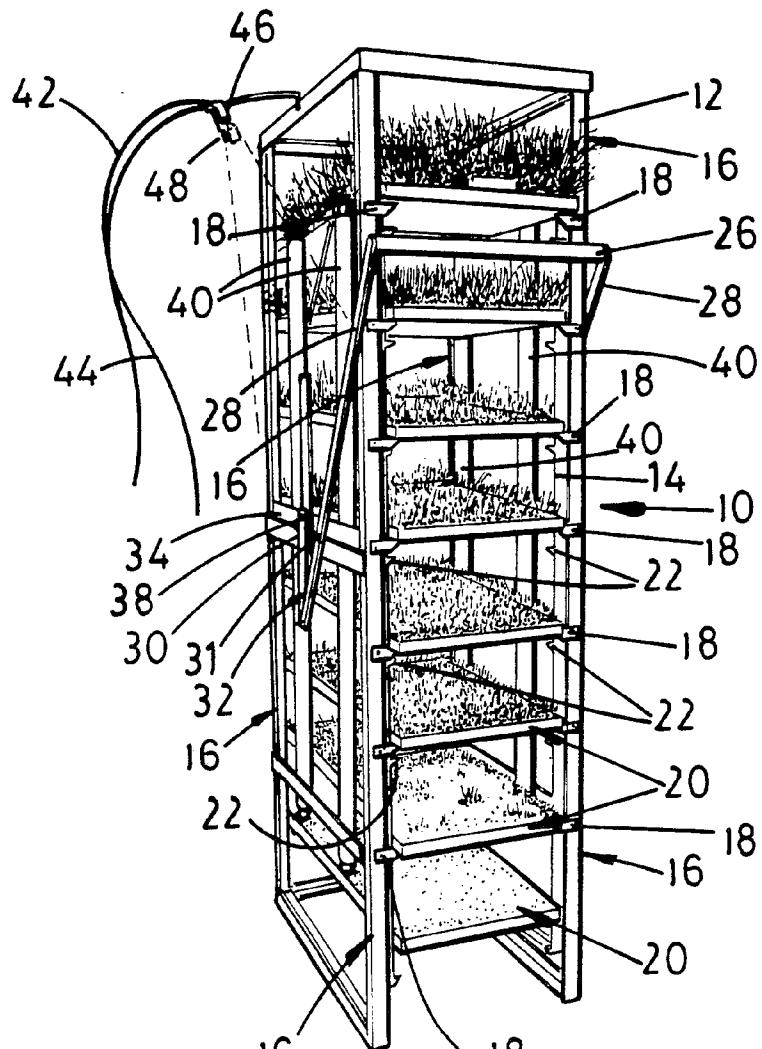


FIG. 1

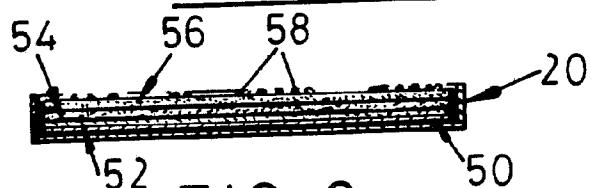


FIG. 2

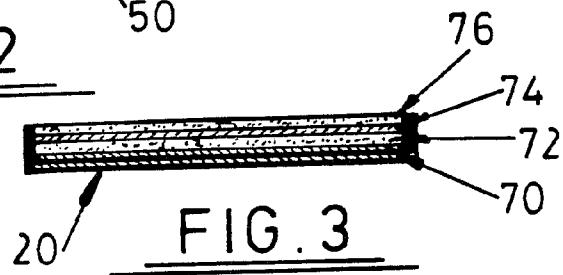


FIG. 3

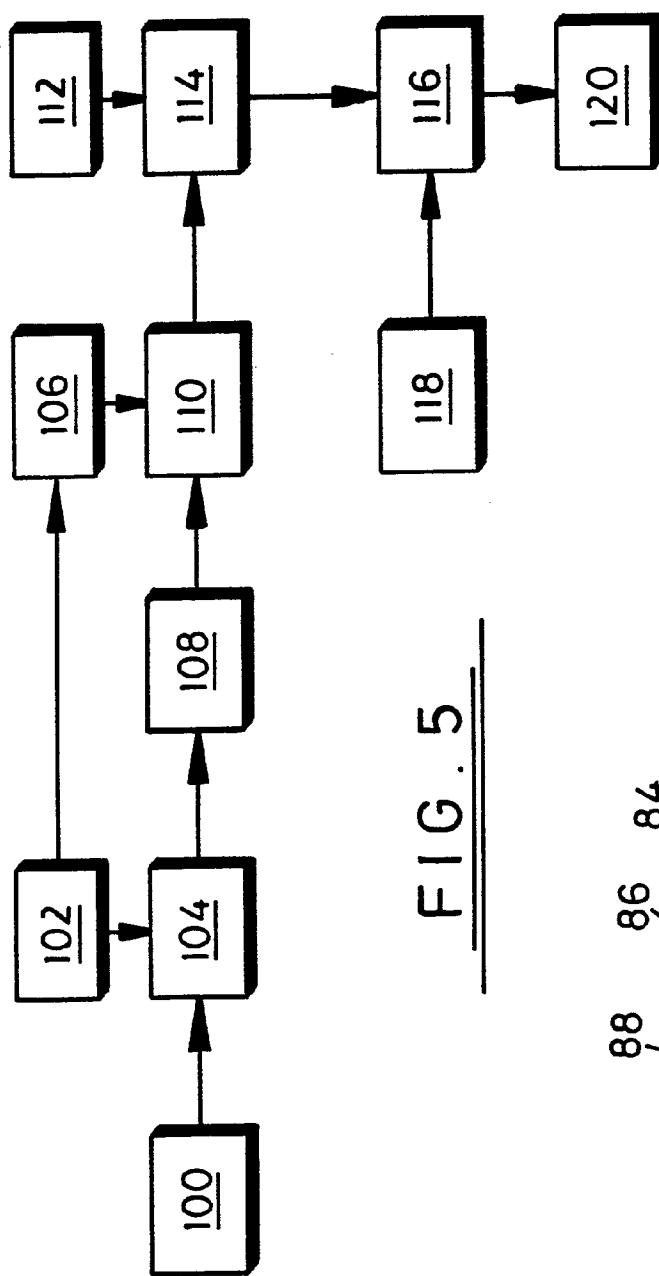


FIG. 5

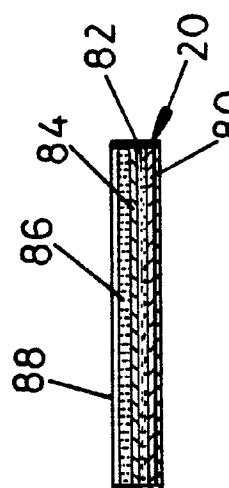


FIG. 4

Apparatus for and method of growing  
plants from seeds.

DESCRIPTION

This invention concerns apparatus for and a  
5 method of growing plants, particularly crops and  
especially grass, from seeds.

Crops, such as barley, used for animal fodder may  
be required more or less daily, so that continuous  
production thereof would be desirable. The ability to  
10 grow grass in sufficient quantities and in such a  
manner as to be suitable for covering sports grounds is  
also desirable.

The object of this invention is to provide means  
capable of satisfying these requirements.

15 According to one aspect of the present invention  
there is provided a method of growing plants from  
seeds, such as for producing turfs comprising spreading  
seed mixed with a seed growing medium on an open-weave  
fabric supported on a water bearing substrate on a tray  
20 or other suitable support therefor.

The open-weave fabric is preferably of a natural  
material which will degrade to provide additional

nutrient material. Suitable open-weave fabrics for use in the method of the invention include hessian, jute, butter muslin and mutton cloth.

The water bearing substrate may comprise one or 5 more of soil, peat, compost and sand mixed with water, preferably as a slurry. A preferred substrate comprises an approximate 1:1 mix of soil and compost. Nutrients may also be included in the substrate. The 10 water may be added as such or in a water retaining polymer, such as polyacrylamide. Such a polymer holds a large amount of water compared with its own size so that a large supply of water can be provided in the substrate without it losing form.

Alternatively, the water bearing substrate may 15 comprise a water retaining polymer, such as polyacrylamide mixed with water, optionally with nutrient.

Preferably the mixture of seed and grass growing medium will not be spread directly onto the open-weave 20 fabric but on a layer of water bearing grass growing medium preferably comprising one or more of peat, soil, compost and sand mixed with water bearing polymer, such as polyacrylamide, in the form of a slurry.

To provide grass growth it is preferred to expose 25 the growing seeds/plants to U.V. radiation and

optionally further water suitably in the form of a spray or mist. Warmth may also be important.

Cropping of the growing grass may also be useful in promoting further growth, cropping to a length of 5 1-1 1/4 inches being preferred.

The substrate is itself preferably on a sheet of plastics materials so that when grown to a suitable height, the plants and their growing medium can be rolled up in the plastics sheet for removal from the 10 tray and transportation. The plastics material is preferably black on one face and white on the other, the black face being uppermost. The black face can then retain warmth but the white face prevent excessive heat drying up the grass in its rolled up state. One 15 suitable plastics material for this purpose is believed to be polyethylene but other plastics materials may also be suitable.

The seeds actually grow roots onto and through the open weave cloth and are held there securely. Thus, 20 when the plants have grown to a suitable size the result is similar to a turf. The cloth can be placed in any desired location and the seedling roots then grow into the substrate.

The turfs can be laid to form a flat surface 25 subject to the site being suitably prepared. Uses of

the turfs produced by the method of the invention include lawn formation, sports ground repairs, land reclamation and prevention of soil erosion.

Whilst the production of turfs has been  
5 emphasised, it will be appreciated that the invention encompasses the production of any plant or crop.

According to another aspect of the present invention apparatus for growing plants, especially crops and grass, from seeds comprises a frame or  
10 cabinet supporting a plurality of preferably removable trays for plant growing medium, and preferably means for spraying an aqueous medium onto said trays and means for illuminating the trays to encourage plant growth.

15 The frame or cabinet may be arranged so that the trays can be raised one step at a time (say once per day) for continuous production, the uppermost tray being removed when its seedlings are ready for use and a fresh tray being placed in the bottom  
20 of the frame or cabinet. Typically eight trays may be used, since sufficient growth, particularly of barley, may be achieved under suitable conditions in eight days. The crops from the top tray can then be stripped off each day and used as animal fodder.

25 For grass production which may be required on a large scale i.e. so that a large surface area can be

covered with grass of more or less even growth the trays need not be raised each day but seeds in all trays started together.

For grass production, therefore, a series of apparatus of the invention may be required perhaps arranged side by side in rows. Grass production usually takes about 1 to 2 week, typically ten days.

For moisture, the seed trays are preferably sprayed intermittently, say timer controlled, with water that is formed into a mist or fog by means of compressed air.

For light preferably the apparatus has one or more U.V. lamps attached thereto.

Alternatively the trays may be arranged in a conveyor type system with preferably automatic loading of grass growing materials at one end, U.V. radiation means and water spraying means between conveyor ends and turf removal at the other end. Cropping means may also be located between said conveyor system ends.

This invention will now be further described, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 shows plant growing apparatus in perspective;

Figure 2 is a section through a grass growing

tray;

Figure 3 is a section through another grass growing tray;

Figure 4 is a section through another grass 5 growing tray; and

Figure 5 is a flow diagram showing continuous production of turfs.

Referring to Figure 1 of the accompanying drawings, plant growing apparatus 10 comprises an outer 10 framework 12 of rectangular section and inner framework 14. The outer framework has on its four corner posts 16 pivotable pawls 18 that support trays 20. The inner framework 14 has inwards facing lugs 22.

The inner framework is movable relative to the 15 outer framework by means of a handle 26 that is connected to arms 28 pivotably mounted on outer frame side bars 30 and 31 and then pivotably to links 32 that are in turn connected to side bars 34 of the inner frame. The connection 38 between the links 32 and the 20 bars 34 runs in slots of vertical members 40 upstanding from the side bars 30 of the outer framework.

By pulling down on the handle 26 the inner frame is moved upwards so that the lugs 22 push the trays 20 upwards past the next set of pawls 18 to rest thereon 25 when the handle is released. Thus, the trays can be

raised one step at a time for use in continuation plant growing, the topmost tray being removed each time before the trays are moved upwards and then being replaced as the bottom whe its contents have been  
5 removed.

To provide growth encouraging light two U.V. lamps 40 are mounted on opposite sides of the outer framework.

Moisture for the plants is provided by spraying  
10 using a combination of mains pressure water and high pressure air via lines 42 and 44 respectively and adjacent nozzles 46, 48 respectively. That combination produces a fog of spray that keeps the plant sufficiently moist. The spraying is preferably not  
15 continuous and so is controlled by a timer set to allow spraying at say 30 minute intervals for 30 seconds at a time. A fan (not shown) may also be provided to distribute the spray evenly.

The trays 20 contain, for example, as illustrated  
20 in Figure 2 a growing medium which comprises a sheet 50 of plastics, preferably polyethylene, that is black on one face and white on the other, the black face being uppermost, a layer 52 of peat or sand, a layer 54 of seed soil and a layer of open-weave cloth 56, such as mutton cloth, butter muslin or jute, that has been  
25

soaked in or coated with a gel type rooting medium, such as Fisons Clearcut. Seeds 58 of the required plant mixed with peat/soil are spread onto the growing medium and left to grow with intermittent spraying with water and under continuous U.V. light. Either the trays can be prepared one per day for continuous production or all at the same time.

For the former, an eight tray apparatus as illustrated is suitable since it usually takes about 10 eight days for barley seeds to grow into plants that are ready to be used for animal fodder. thus, each day of the eight day cycle a fresh tray of seeds the tray or trays present in the apparatus are raised one step and a fresh tray placed on the bottom set of pawls. 15 After eight days the topmost tray can be removed and so on every day thereafter.

For the latter which is preferred for grass production, all the trays are prepared and placed in the apparatus and removed together say ten days later. 20 Large scale production may be achieved by having a plurality of such apparatus in rows or a conveyor type arrangement having a tray filling station at one end, intermediate U.V. radiation means and optionally water spray means, turf removal means at the other end.

25           Turning to Figure 3 a grass growing tray 20

contains a sheet of polyethylene 70 which has a black face and a white face, the black face being uppermost, a layer 72 of a mixture of soil, compost, nutrient and water held in polyacrylamide particles, a layer of 5 hessian 74 and a sprinkling 76 of grass seed and soil/compost mixture. (see Examples 1 and 2).

In Figure 4 which refers to Example 3, a tray 20 contains a sheet 80 of polyethylene, white on one side and black on the other, the black side being 10 uppermost. On the polyethylene sheet 80 is a layer 82 of polyacrylamide mixed with water and nutrient followed by a sheet of hessian 84. On the hessian 84 is a slurry 86 of peat, soil, polyacrylamide and water and on that is a moist sprinkling 88 of grass seed 15 mixed with soil and peat.

The use of such a growing medium, for example for grass, produces a "turf" on the cloth that can be rolled up in the plastics sheet for transport and then placed in any desired location. The grass quickly 20 establishes itself onto any suitable surface. The "turfs" so produced are maybe suitable for use in covering sports grounds and pitches where quality and evenness of the surface are important.

Finally in Figure 5 a flow diagram shows the 25 stages for production of a turf. at 100 a sheet of

polyethylene is laid onto a steel tray. The polyethylene has a black face uppermost and a white face downmost. At 102 a mixture of water and polyacrylamide is prepared optionally with nutrient. 5 This mixture is spread on the polyethylene sheet at 104 and also mixed with peat and soil at 106. At 108 a sheet of hessian is laid on the polymer mixed and at 110 the mixture from 106 added.

At 112 a mixture of grass seed, peat and soil and 10 water is prepared and at 114 spread on the tray. The tray then passes to a growing area 116 which may have U.V. radiation means, heaters for warmth and moisture application means to promote growth.

When the grass has grown to a predetermined 15 height the tray is transferred to 118 for cropping such as by an overhead rotating blade set at a desired height. After cropping the tray is returned to the growing area 116.

When satisfactory grass growth is achieved the 20 resultant turf is removed at 120 and rolled up in its polyethylene sheet for storage and/or transportation.

The invention will now be further described by means of the following Examples.

25

#### EXAMPLE 1

In a steel tray approximately 1m x 0.5m was laid

a sheet of polyethylene, having one side white and the other side black, with the black side uppermost. On the polyethylene sheet was spread 2 litres of compost/soil 1:1 mixture (Levington (Fisons) and peat compost are suitable alternatives). Next 10g of 5 polyacrylamide (Broadleaf P4 supplied by Agricultural Polymers Limited) and 4 to 6 pints of water were mixed and added to the compost. The resultant layer was covered with a layer of open-weave fabric, such as 10 hessian, thoroughly soaked with water. A mix of 10g of polyacrylamide and 4 to 6 pints of water was then added followed by 1/2lb mixture of compost and 1-1 1/2 ounces of grass seed.

After two weeks under U.V. light and occasional 15 application of water mist a healthy grass crop was produced. When rolled up in the polyethylene sheet, the grass could be kept for upto 6 weeks before being laid in position as a turf.

20

EXAMPLE 2

Example 1 was repeated but with a base layer, i.e. beneath the open-weave fabric, of a mix of 1/2 litre of compost, 1/2 litre of soil, 10g of polyacrylamide, 5g of nutrient and 2 pints of water. 25 That was found to be sufficient for grass growth to a reasonable extent in one week and made it easier to

roll up the resultant turf in the sheet of polyethylene for transport and storage.

EXAMPLE 3

5 In a steel tray 1m x 0.5m was laid a sheet of polyethylene, having one side black and the other side white, the black side being uppermost. On the polyethylene sheet was spread a mixture of 10g polyacrylamide, 1 pint of water and 5g nutrient, such as phostrogen. On that was laid a sheet of moist hessian. Then a slurry of compost, soil, polyacrylamide and water was spread on the hessian and a mixture of grass seed and moist soil or peat.

15 In two weeks a good turf was grown without the use of U.V. light, and when rolled up in the polyethylene sheet was kept for four weeks when the turf was still usable.

## CLAIMS

1. Apparatus for use in growing plants from seeds comprises a frame or cabinet supporting a plurality of removable trays for plant growing medium, the trays

5 being raisable one step at a time.

2. Apparatus as claimed in claim 1 further comprises means for spraying aqueous medium onto said trays.

3. Apparatus as claimed in claim 1 or 2 further comprising means for illuminating the trays.

10 4. Apparatus as claimed in claim 3, wherein said illuminating means comprises one or more U.V. lamps.

5. Apparatus as claimed in any one of claims 1 to 4, wherein said trays are raisable past pivotable pawls but not lowerable past said pawls.

15 6. Apparatus for use in growing plants substantially as hereinbefore described with reference to and as illustrated in Figure 1 of the accompanying drawings.

7. A method of producing turfs comprising spreading grass seed mixed with a grass growing medium on an open-weave fabric supported on water bearing substrate on a tray or other support therefor.

20 8. A method as claimed in claim 7 wherein the

open-weave fabric is selected from hessian, jute, butter muslin and mutton cloth.

9. A method as claimed in claim 7 or 8, wherein the substrate comprises water retained in a polymer.

5 10. A method as claimed in claim 9, wherein the polymer is polyacrylamide.

11. A method as claimed in any one of claims 7 to 10, wherein the water bearing substrate further comprises a mixture of seed soil or peat, compost.

10 12. A method as claimed in any one of claims 7 to 11, wherein the substrate further comprises nutrient.

13. A method as claimed in any one of claims 7 to 12, wherein the open-weave cloth is soaked in nutrient containing water.

15 14. A method as claimed in any one of claims 7 to 13, comprising spreading the substrate on a sheet of plastics material.

15, A method as claimed in claim 14, wherein the plastics sheet is of polyethylene.

20 16. A method as claimed in claims 14 or 15, wherein the plastics sheet is black on one side and white on its other side.

17. A method as claimed in claim 16, wherein the black side of the plastics sheet is uppermost.

25 18. A method as claimed in any one of claims 7 to 17

comprising exposing the grass/seed to U.V. radiation.

19. A method as claimed in any one of claims 7 to 18,  
comprising exposing the grass/seed to water vapour.

20. A method as claimed in any one of claims 7 to 19,  
5 comprising the step of cropping the growing grass to  
1-1 1/4 inches.

21. A method as claimed in claim 7 substantially as  
hereinbefore described with reference to any one of the  
Examples.

10 22. A turf produced by the method as claimed in any  
one of claims 7 to 21.